



**the hallicrafters co.**  
MANUFACTURERS OF RADIO AND ELECTRONIC EQUIPMENT, CHICAGO 24, U. S. A.



FIG. 1 MODELS S-40B & S-40BU

92X1120

## DESCRIPTION

Models S-40B and S-40BU are sensitive superheterodyne communications receivers which provide reception of standard broadcast and foreign or domestic shortwave stations over four frequency ranges with continuous tuning from 540 KC (kilocycles) to 44 MC (megacycles). The receivers employ seven tubes plus rectifier and provide both AM and CW reception.

### FREQUENCY COVERAGE

The four frequency ranges or bands are clearly indicated on the large main tuning dial. The locations of the amateur bands and foreign stations are indicated on the dial for convenient reference. Also on the main tuning dial is a special logging scale for use when logging frequencies of special interest.

BAND	FREQUENCY RANGE
1	540 KC - 1680 KC
2	1680 KC - 5.4 MC
3	5.3 MC - 15.5 MC
4	15.5 MC - 44 MC

The electrical BAND SPREAD control provides a vernier or fine tuning adjustment throughout the entire tuning range of the receiver.

Other special features included in the receiver are automatic volume control (AVC), automatic noise limiter and provision for headphone operation. The STANDBY/RECEIVE switch permits disabling of the receiver for standby periods, at the same time maintaining the tube heaters at operating temperature.

The receiver is housed in an attractive, well ventilated steel cabinet which has a length of 18-1/2 inches, a height of 8-1/2 inches and depth of 11 inches.

The S-40B is designed to operate from a 105-125 volt, 50-60 cycle AC power source. The S-40BU, a universal model of the S-40B, permits operation from 25-60 cycle AC sources at voltages ranging from 110 to 250 volts. The power consumption of each model is 75 watts.

## INSTALLATION

**UNPACKING** Check all shipping tags and labels for instructions before removing or destroying them.

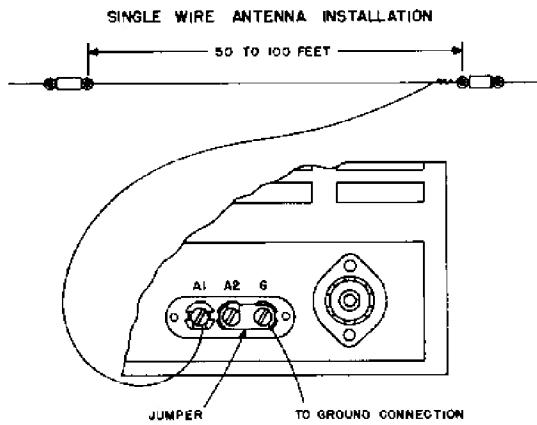
**LOCATION** - The receiver is equipped with rubber mounting feet for table top or shelf mounting. When locating the receiver, avoid excessively warm locations and recessed installations which prevent proper air circulation.

**POWER SOURCE** - The S-40B can be operated from a 105-125 volt, 50-60 cycle AC power outlet. The universal model, the S-40BU, is designed for operation from 115, 130, 150, 220 and 250 volt, 25-60 cycle AC sources. A selector switch, located on the power transformer, permits operation of the S-40BU at the line voltages shown. If in doubt as to the frequency and voltage rating of your power source, contact the local power company representative. Attempting to operate the receiver from sources of power not specified above may result in damage to the receiver.

**CAUTION** - When operating the universal model, it is essential that the selector switch setting on the power transformer correspond to the operating line voltage before connecting the receiver to the AC power source.

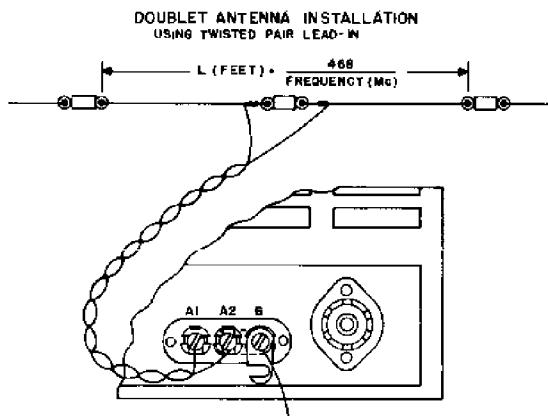
**ANTENNA** - A three terminal strip marked A1, A2 and G, is provided on the rear apron of the chassis for antenna connection. Very satisfactory results can be obtained throughout the tuning range of the receiver with a conventional single wire antenna installation (see Fig. 2). In some instances, a short length of wire strung about the room may suffice. However, for improved reception of the higher frequency bands, it is recommended that a doublet antenna installation be employed (see Fig. 3). For further information concerning antennas refer to "ARRL ANTENNA HANDBOOK".

**SINGLE WIRE ANTENNA** - Connect a single wire antenna 50 to 100 feet long (including lead-in) to terminal A1 on the antenna terminal strip. Connect the jumper between terminals A2 and G. Erect the antenna as high as possible and free of surrounding objects. A ground wire connected between terminal G and a suitable ground such as a cold water pipe or outside ground rod may improve reception.



92A432

FIG. 2 SINGLE WIRE ANTENNA INSTALLATION



92A432-A

**DOUBLET ANTENNA** - The overall length, in feet, of the doublet antenna may be determined by dividing 468 by the desired frequency in megacycles. A doublet antenna is somewhat directional broadside to its length and should be so oriented if maximum pickup from a given direction is to be expected.

When feeding the doublet antenna with twisted pair or a ribbon type transmission line, connect the transmission line to terminals A1 and A2 on the antenna terminal strip and disconnect the jumper between terminals A2 and G.

When using a coaxial transmission line, connect the inner conductor to terminal A1, the outer conductor to terminal A2 and place the jumper between terminals A2 and G.

FIG. 3 DOUBLET ANTENNA INSTALLATION

## OPERATION

Each control of this receiver performs a definite function that contributes to the outstanding reception capabilities. Full appreciation of the receiver is to be expected only after you have become familiar with each of the controls and the effect their operation has on the performance of the receiver. As an added feature for convenience, the control positions for standard broadcast reception are marked in red. The following use of the controls is recommended to obtain optimum performance from the receiver.

- SENSITIVITY** control This control is normally set fully clockwise for maximum sensitivity. In some rare instances, strong local signals may overload the receiver input. Distortion, caused by this condition, can be eliminated by reducing the receiver sensitivity slightly.
- BAND SELECTOR** switch This switch is used to select the desired band or frequency range. The frequencies covered by each position of the **BAND SELECTOR** are read directly from the main tuning dial scale which corresponds to the setting of the **BAND SELECTOR** switch.
- VOLUME** control This control is used to regulate audio volume. Turning the control clockwise increases volume.
- AVC** switch This switch, when set to the **ON** position, places the automatic volume control circuit in operation. The **AVC** circuit provides a constant audio output level over large variations in signal strength at the antenna. The **AVC** switch should be set at **OFF** for CW reception.
- TUNING** control This control should be set for the desired station frequency after setting the **BAND SELECTOR** switch. Frequencies on all bands are shown in megacycles.
- IMPORTANT** - The main tuning dial calibration is correct only when the **BAND SPREAD** dial pointer is set at 0.
- AM/CW** switch This switch, when set at CW, places the beat frequency oscillator (BFO) in operation making code signals audible. For AM reception, set the switch at AM.
- BAND SPREAD** control This control functions to electrically spread out the crowded amateur and short-wave bands. Band spread tuning is not necessary on the broadcast band.
- Band spread tuning is accomplished as follows: (1) Set the band spread dial pointer at 0 (2) Position the **TUNING** control for the high frequency end of the amateur band or range of frequencies to be covered and (3) Tune through the amateur band or frequency range with the **BAND SPREAD** control.
- NOTE:** It is possible to log shortwave stations by recording the settings of the main tuning and band spread logging scales.
- NOISE LIMITER** switch This switch is normally set at **OFF**. Set the **NOISE LIMITER** switch at **ON** when severe electrical disturbances interfere with reception.
- TONE** control This control attenuates the high audio frequencies to the extent required by various receiving conditions. In addition, it is used to turn the receiver on and off. In the **AC OFF** position, the power to the receiver is disconnected. For CW reception, set the **TONE** control at **LOW**.
- PITCH CONTROL** This control is used to vary the pitch of the CW code signal when listening to amateur or commercial code stations and should be set for the tone most pleasing to the operator.
- STANDBY/RECEIVE** switch This switch, normally set at **RECEIVE**, is particularly useful to the "ham" as it provides a means of placing the receiver in an inoperative condition for standby periods, at the same time maintaining the tube heaters at operating temperature. The receiver is inoperative when the switch is set at **STANDBY**.

**HEADPHONE OPERATION** - The **PHONES** jack, located on the front panel, permits the use of standard headphones with the receiver. The speaker is automatically disconnected when the headphone plug is inserted in the **PHONES** jack.

SERVICE

## **GENERAL SPECIFICATIONS**

Tubes . . . . .	Eight including one rectifier
Speaker . . . . .	5" PM
Voice Coil Impedance. . . . .	3.2 ohms
Antenna Input . . . . .	For a 50-600 ohm line or single wire lead-in
Intermediate Frequency . . . . .	455 KC
Power Supply .. Model S-40B:	105-125 V. 50-60 cycle AC
.. Model S-40BU:	105-250 V. 25-60 cycle AC
Power Consumption . . . . .	75 watts

#### **FREQUENCY COVERAGE**

Band	Frequency Range	Reception
1	540 KC - 1680 KC	AM/CW
2	1680 KC - 5.4 MC	AM/CW
3	5.3 MC - 15.5 MC	AM/CW
4	15.5 MC - 44 MC	AM/CW

**DIAL LAMP REPLACEMENT** - Refer to Fig. 7 for the location of the dial lamps used in the receiver. To gain access to defective lamps, raise the hinged top cover of the cabinet. To make a dial lamp replacement, unclip the dial lamp socket from the mounting bracket. Replace defective lamps with 6-8 volt, 250 ma (blue bead) Mazda #44 pilot lamps.

**RESTRINGING DIAL CORD** - The dial drive system of the receiver consists of two separate string drives (1) main tuning dial drive and (2) band spread tuning dial drive. All restringing should be done with the main tuning and band spread gangs fully meshed.

**MAIN TUNING DIAL DRIVE** - Tie one end of an 16 inch length of 30 lb. test dial cord to the tension spring at position 1 on the main tuning capacitor drive pulley. Stretch the tension spring and follow the stringing procedure 1 through 4. At position 4, tie the cord securely to the spring.

**BAND SPREAD DIAL DRIVE** - Tie one end of a 24 inch length of 30 lb. test dial cord to the tension spring at position A on the band spread capacitor drive pulley. Stretch the tension spring and follow the stringing procedure A through G. At position G, tie the cord securely to the spring.

**TUBE REPLACEMENT** - The tube types and their relative location in the receiver are shown in Fig. 7. Raise the hinged top cover of the cabinet to gain access to all tubes. When installing a replacement tube, insert the center guide pin of the tube into the center hole of the tube socket, rotate the tube until the key on the guide pin drops into the notch in the socket hole and then push down until the base of the tube rests firmly on the socket. Handle all tubes with care as they are fragile and will not withstand mechanical abuse.

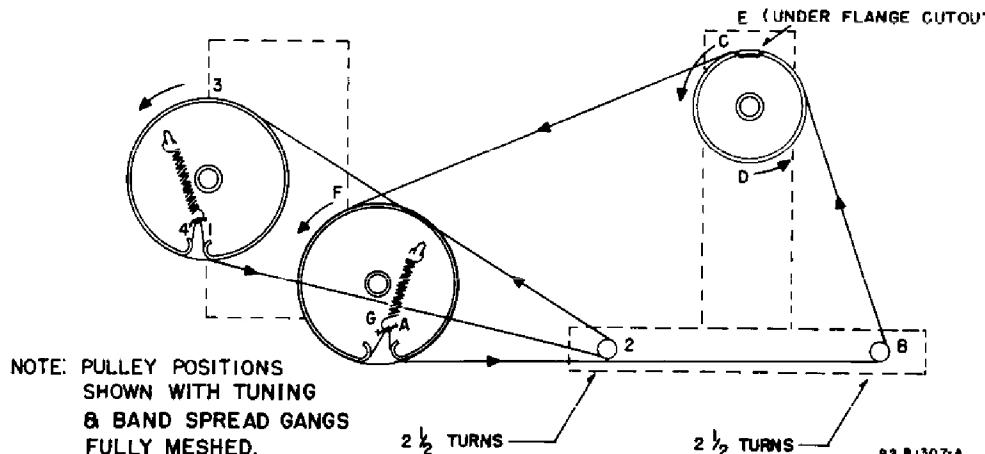


FIG. 4 DIAL CDRD STRINGING DIAGRAM

**SERVICE OR OPERATING QUESTIONS** - For further details regarding operation or servicing of the receiver, contact your dealer. Make no shipments directly to the factory as the factory does not accept the responsibility for unauthorized shipments. Factory type service is available at any **HALLICRAFTERS AUTHORIZED SERVICE CENTER**. For the location of the **SERVICE CENTER** nearest you; consult your dealer, telephone directory or look for the sign shown at the right.

The Hallicrafters Co. reserves the privilege of making revisions in current production of equipment and assumes no obligation to incorporate these revisions in earlier models.



## ALIGNMENT PROCEDURE

### EQUIPMENT REQUIRED

1. Signal generator, with amplitude modulated output, covering 455 KC to 36 MC. Use a modulated signal generator output for every step except step 2.
2. Output meter. Connect the meter across the speaker voice coil terminals.
3. Standard RMA dummy antenna consisting of a 200 mmf. capacitor in series with a 20 microhenry choke which is shunted by a 400 mmf. capacitor in series with a 400 ohm carbon resistor.
4. Alignment tool made of polystyrene or other similar material.

It is necessary to remove the receiver chassis from the cabinet to make the I-F alignment. The chassis is held in the cabinet by three screws along the bottom edge of both the front panel and rear of the cabinet and by two screws on either side of the front panel.

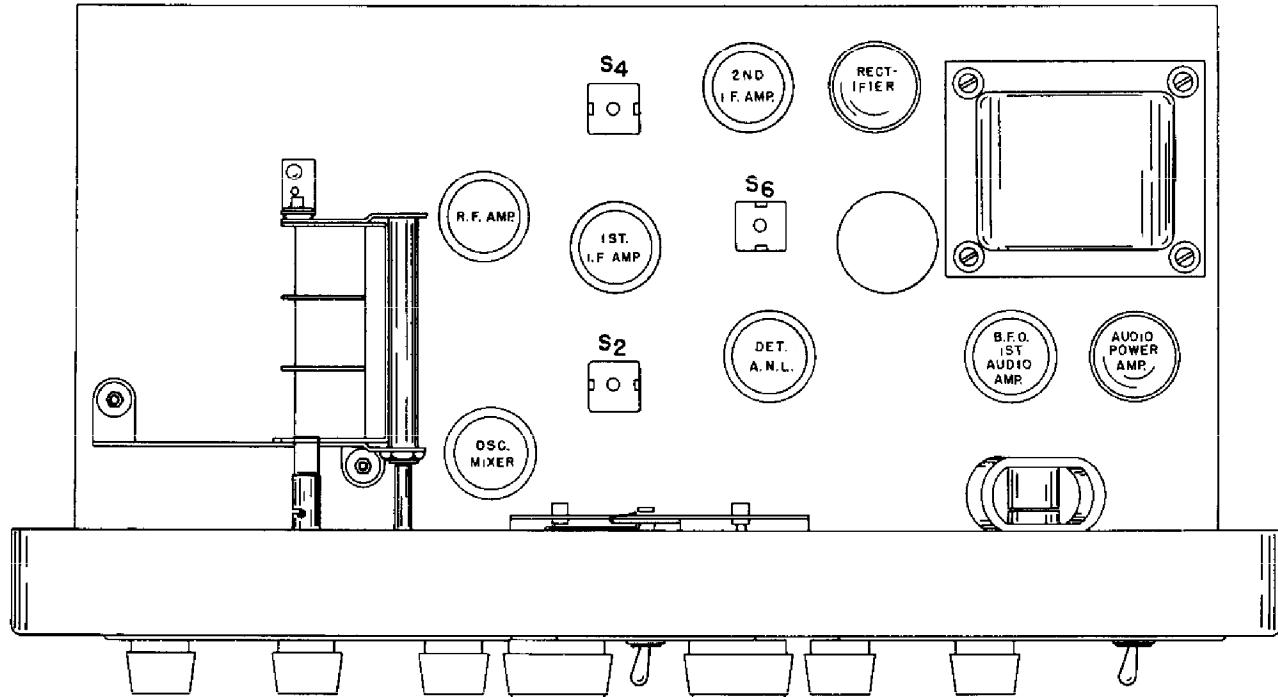
RF alignment should be made with the chassis in the cabinet. Holes in the bottom of the cabinet provide access to all RF adjustments.

Before starting alignment, set the VOLUME, SENSITIVITY and BAND SPREAD controls fully clockwise, AVC and NOISE LIMITER switches at OFF, CW/AM switch at AM and the TONE switch at HIGH. Refer to Figs. 5 and 6 for the location of all adjustments.

### ALIGNMENT CHART

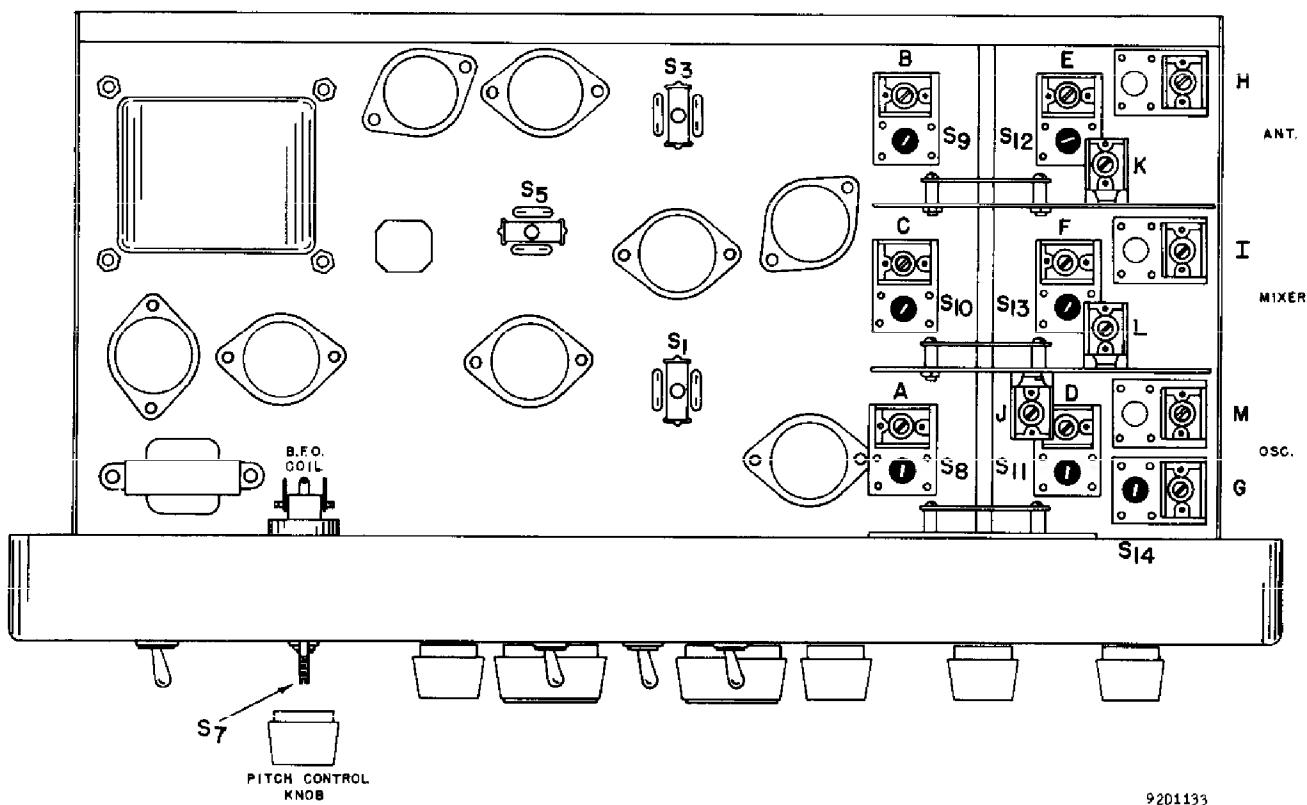
STEP	SIGNAL GENERATOR CONNECTION	SIGNAL GEN. FREQUENCY	BAND SELECTOR SETTING	MAIN TUNING DIAL SETTING	ADJUST	REMARKS
1	Connect the high side of the generator to the stator plates of the center section of the tuning gang. Connect the ground side of the generator to the chassis.	455 KC	1	1000 KC	S1, S2, S3, S4, S5, S6	Adjust for maximum audio output at the speaker voice coil. Use only enough signal generator output to obtain a 50 milliwatt reading on the output meter.
2*	Same as Step 1	455 KC (No Modulation)	1	1000 KC	S7	Set the CW/AM switch at CW. Remove the PITCH CONTROL knob and adjust S7 for a zero beat. Replace the knob with the dot in top center position.
3	Connect the high side of the generator to A1 on the antenna terminal strip through a standard RMA dummy antenna. Place the jumper between A2 and G. Connect the ground side of the generator to the chassis.	36 MC  18 MC	4  4	36 MC  18 MC	A, B, C  S8, S9, S10	Maximum output as in Step 1.
4	Same as Step 3	14 MC  10 MC	3  3	14 MC  10 MC	D, E, F  S11, S12, S13	Maximum output as in Step 1.
5	Same as Step 3	5 MC  1.8 MC	2  2	5 MC  1.8 MC	G, H, I  S14	Maximum output as in Step 1.
6	Same as Step 3	1500 KC  600 KC	1  1	1.5 MC  .6 MC	J, K, L  M	Maximum output as in Step 1.

\* Reset the CW/AM switch at AM when Step 2 is completed.



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FIG. 5 TOP VIEW - LOCATION OF ALIGNMENT ADJUSTMENTS



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FIG. 6 BOTTOM VIEW - LOCATION OF ALIGNMENT ADJUSTMENTS

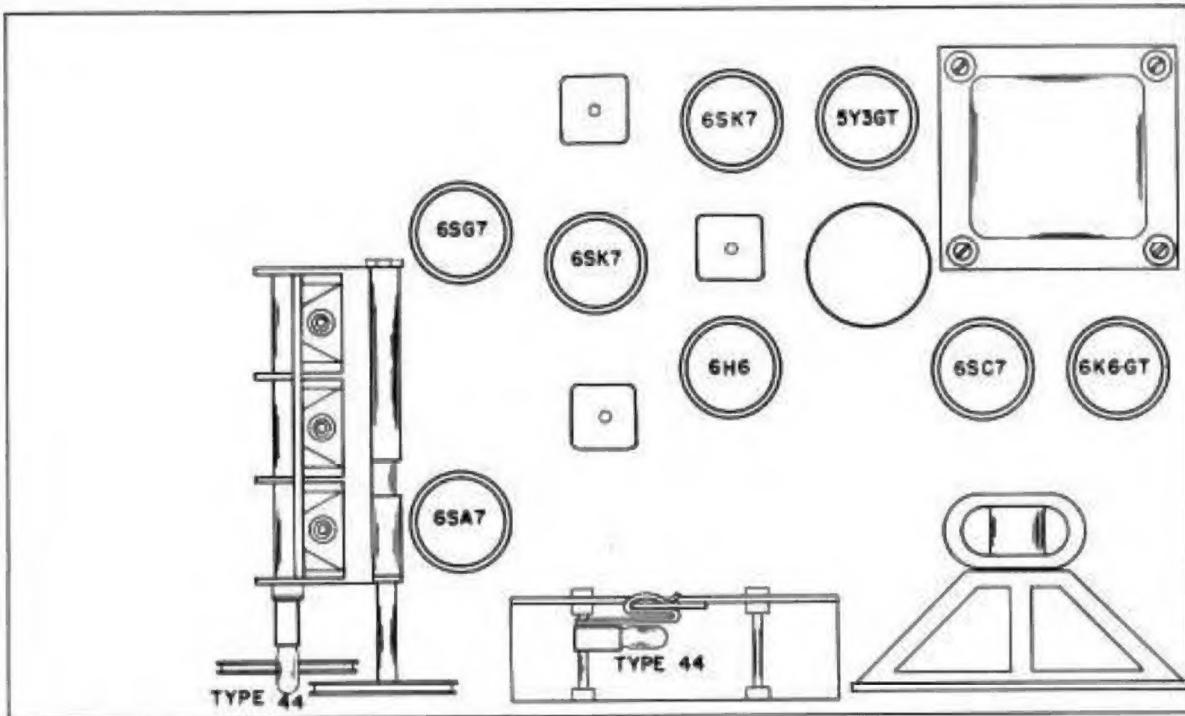
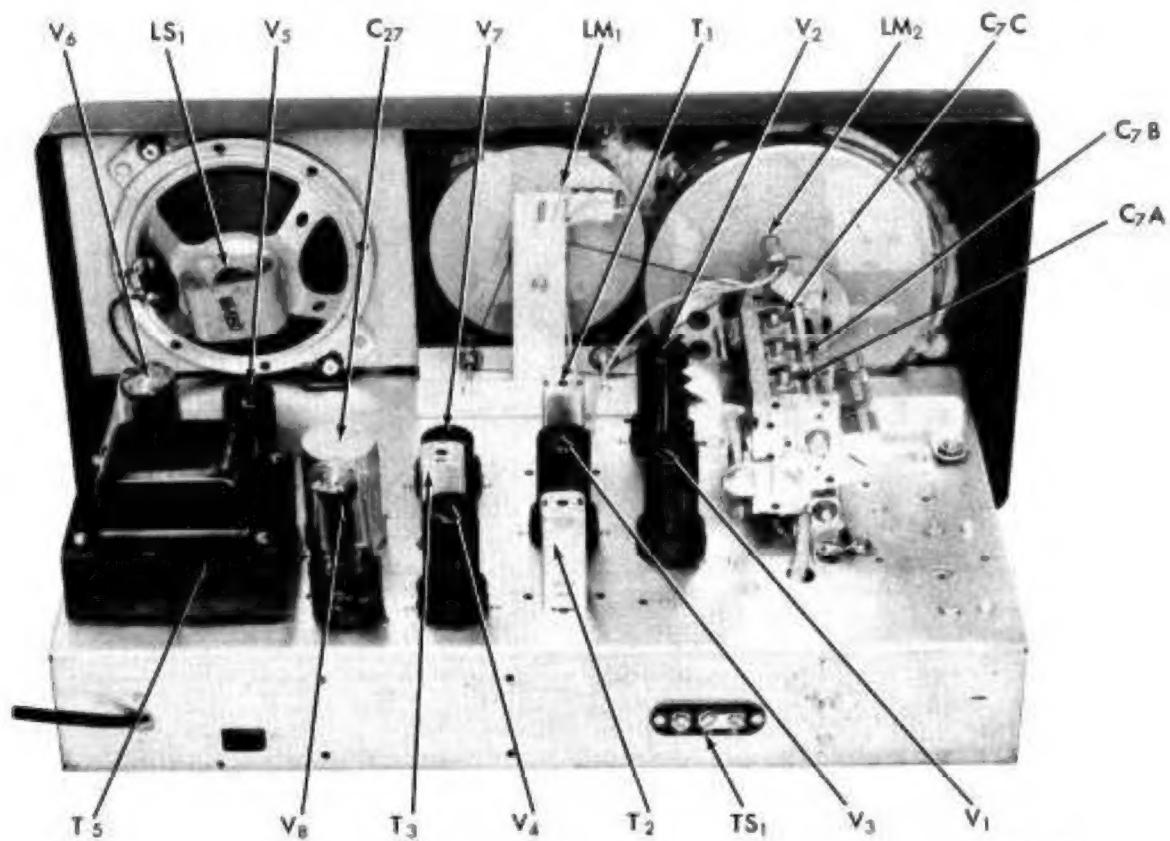
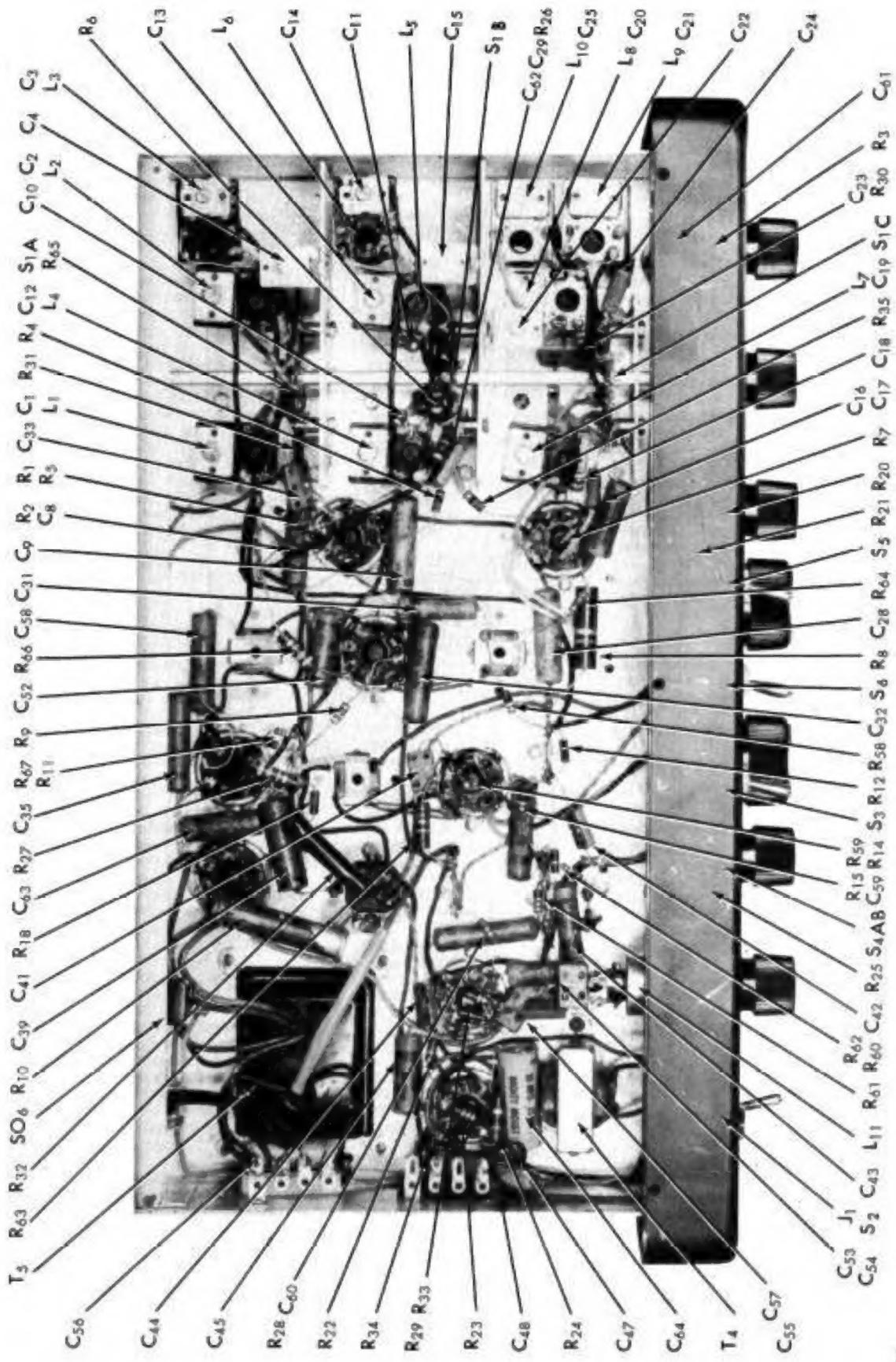


FIG. 7 TOP VIEW - LOCATION OF TUBES AND DIAL LAMPS



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FIG. 8 TOP VIEW - COMPONENT LOCATION



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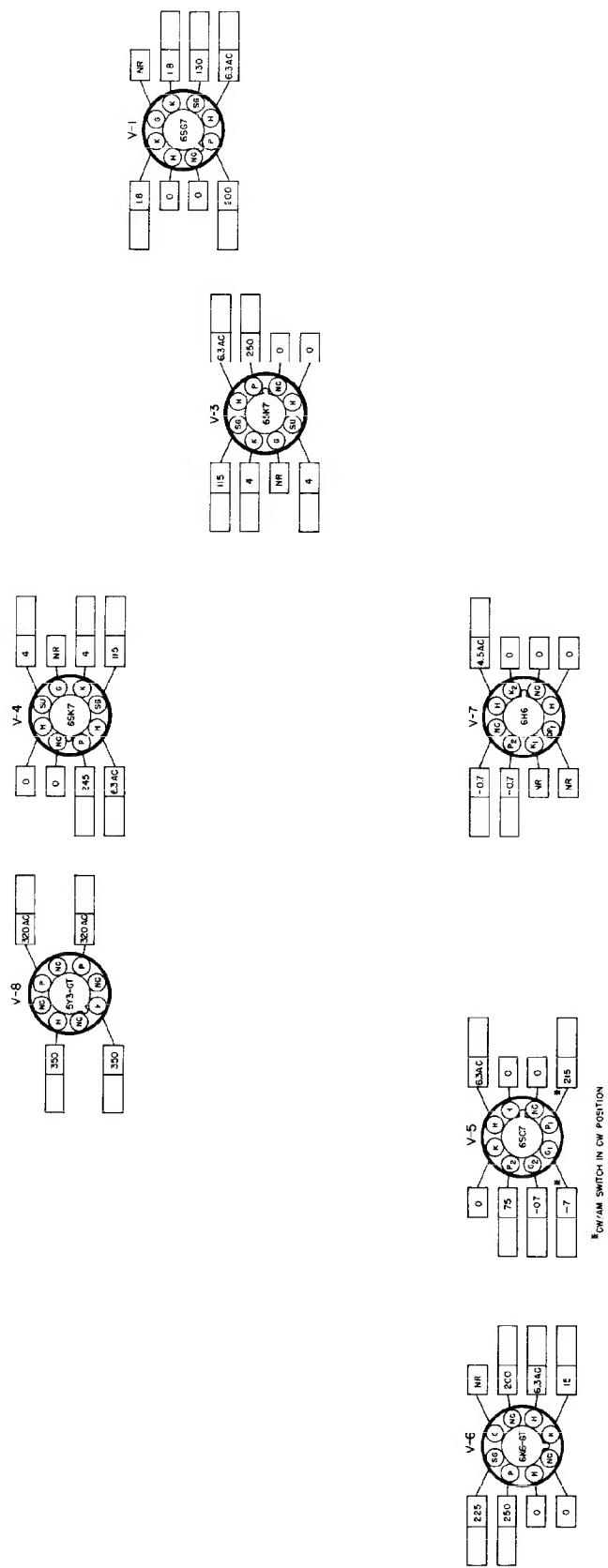
FIG. 9 BOTTOM VIEW - COMPONENT LOCATION

FIG. 10 TUBE SOCKET VOLTAGE CHART

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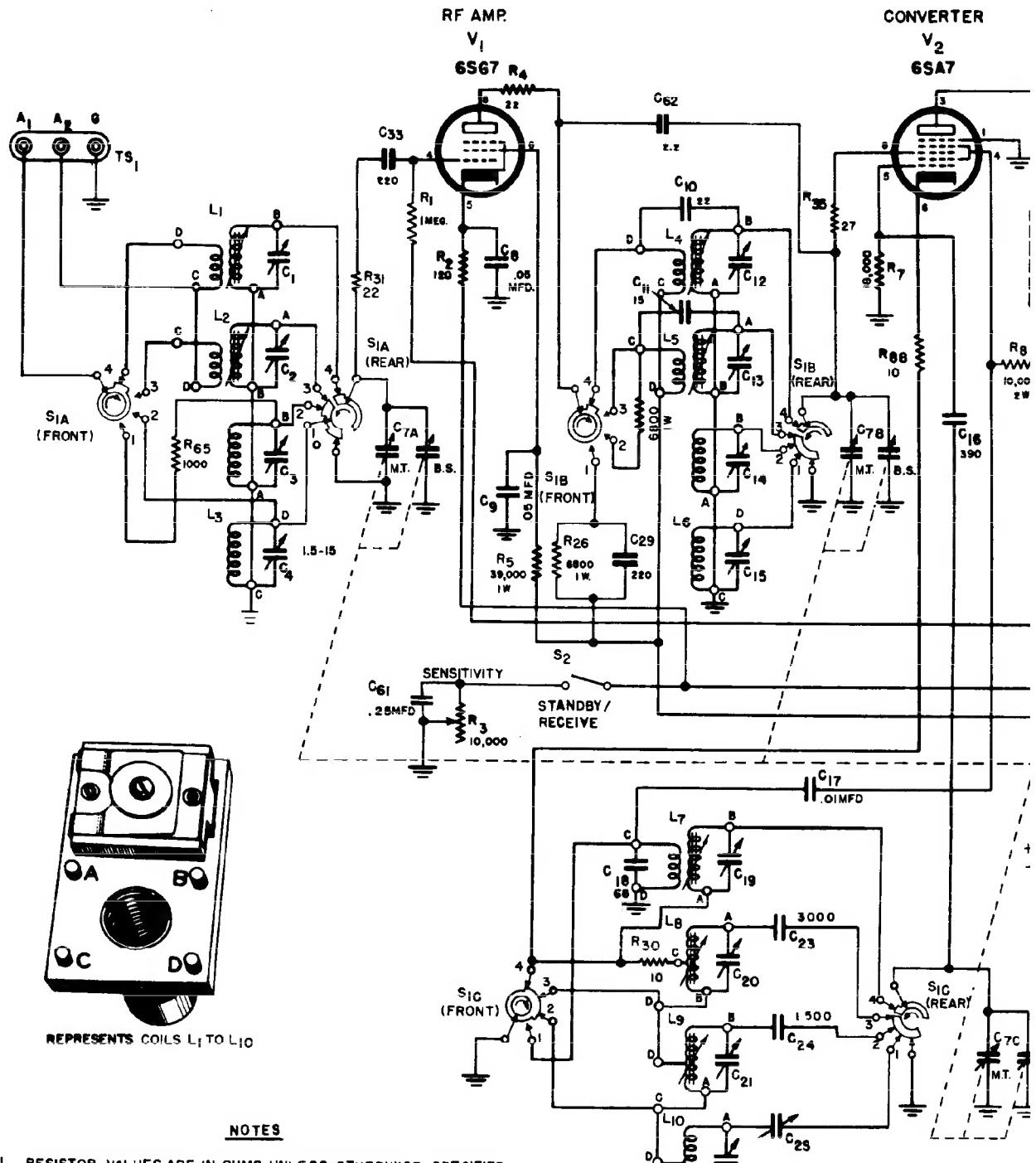
FRONT APRON  
BOTTOM VIEW OF CHASSIS

NOTES—  
 1. SOCKET VIEWS ARE BOTTOM VIEWS.  
 2. ALL VOLTAGES ARE MEASURED BETWEEN TUBE SOCKET TERMINALS AND CHASSIS WITH ZERO SIGNAL INPUT.  
 3. LINE VOLTAGE 175 V AC  
 4. ALL VOLTAGES ARE DC UNLESS OTHERWISE SPECIFIED  
 5. DC VOLTAGES SHOWN WERE MEASURED WITH A VACUUM TUBE VOLTMETER  
 6. NO CONNECTION VOLTAGE SHOWN FOR THIS TERMINAL WHEN TERMINAL IS USED AS A TIE LUG  
 7. NR=NOT READABLE (READING GENERALLY MEANINGLESS)  
 8. □ SPACE PROVIDED FOR SERVICE METER READINGS



## SERVICE PARTS LIST

Schematic Symbol	Description	Hallcrafters Part Number	Schematic Symbol	Description	Hallcrafters Part Number
<b>CAPACITORS</b>					
C-1,2,3,12, 13,14,19, 20,21	Trimmers; part of coils L-1,2, 3, 4, 5, 6, 7, 8 and 9 respectively	- - - - -	L-6	Coil, RF; bands 1 and 2	51B1240
C-4,15,22	Trimmer, 1.5-15 mmf.	44A191	L-7	Coil, oscillator; band 4	51B791
C-7A,B&C	Tuning capacitor, 3 section	48C240	L-8	Coil, oscillator; band 3	51B913
C-8,32,35, 58,59,60	.05 mfd. 200 V., tubular	46AU503J	L-9	Coil, oscillator; band 2	51B789
C-9,28	.05 mfd. 600 V., tubular	46AY503J	L-10	Coil, oscillator; band 1	51B912
C-10	22 mmf. 500 V., ceramic	47X21UK220M	L-11	Coil, BFO	54B044
C-11	15 mmf. 500 V., ceramic	47X21UK150M	T-1,2	Transformer, 1st and 2nd IF	50C243
C-16	390 mmf. 500 V., mica	47X20B391K	T-3	Transformer, IF; detector stage	50C242
C-17,53	.01 mfd. 600 V., tubular	46AY103J	T-4	Transformer, audio output	55B093
C-18	.68 mmf. 500 V., ceramic	47X25UK680K	T-5	Transformer, power; model	52A209
C-23	3000 mmf. 500 V., mica	47X30C302K	T-5	S-40B	
C-24	1500 mmf. 500 V., mica	47X30C152J		Transformer, power; model	52C210
C-25	Padder; part of coil L-10	- - - - -		S-40BU	
C-27A,B&C	30-10-10 mfd. 450 V., electrolytic	45A082	<b>SWITCHES</b>		
C-29,33	220 mmf. 500 V., mica	47X20B221K	S-1A	Switch wafer, BAND SELECTOR; antenna stage	60B389
C-31,43	.02 mfd. 200 V., tubular	46AU203J	S-1B	Switch wafer, BAND SELECTOR; RF stage	62B039
C-38	2 mmf., twisted wire assembly	- - - - -	S-1C	Switch wafer, BAND SELECTOR; oscillator stage	62B044
C-39	.1 mfd. 600 V., tubular	46AY104J	S-2,3,5,6,	Switch, toggle (spst); STANDBY/ RECEIVE, NOISE LIMITER, AVC and CW/AM	60A138
C-41,42	.47 mmf. 500 V., mica	47X20B470M	S-4	Switch, PWR-TONE Shaft and index plate, BAND SELECTOR	60A225 60B392
C-44,55	.270 mmf. 500 V., mica	47X20B271K	<b>PLUGS AND SOCKETS</b>		
C-45,48,52, 63	.02 mfd. 600 V., tubular	46AY203J	J-1	Jack, PHONES	36A002
C-47	.002 mfd. 1000 V., tubular	46A104	PL-1	Line cord and plug	87B1573
C-54	.470 mmf. 500 V., mica	47X20B471J		Socket, dial lamp; main tuning dial	86A070
C-56	.01 mfd. 600 V., molded tubular	46AC103J		Socket, dial lamp; band spread dial	86B049
C-57	1000 mmf. 500 V., mica	47X25B102M		Socket, octal tube	6A250
C-61	.25 mfd. 200 V., tubular	46AT254J	<b>TUBES AND DIAL LAMPS</b>		
C-62	2.2 mmf. 500 V., bakelite	47A180-4	V-1	63G7: RF amplifier	90X6AG7
C-64	10 mfd. 25 V., electrolytic	45A121	V-2	65A7: converter	90X6SA7
<b>RESISTORS</b>			V-3,4	65K7: 1st and 2nd IF amplifiers	90X6SK7
R-1,62	1 megohm 1/2 watt, carbon	23X20X105M	V-5	65C7: BFO and audio amplifier	90X6SC7
R-2	120 ohms 1/2 watt, carbon	23X20X121K	V-6	6K6GT: audio output	90X6K6GT
R-3	10,000 ohms, SENSITIVITY control	25B590	V-7	61H6: ANL, AVC and detector	90X6H6
R-4,31	22 ohms 1/2 watt, carbon	23X20X220M	V-8	5Y3GT: rectifier	90X5Y3GT
R-5	39,000 ohms 1 watt, carbon	23X30X393K	LM-1,2	Lamp, dial; Mazda #44	39A003
R-6,26	6800 ohms 1 watt, carbon	23X30X682K	<b>MISCELLANEOUS</b>		
R-7	18,000 ohms 1/2 watt, carbon	23X20X183K		Cabinet	66D359
R-8	10,000 ohms 2 watts, carbon	23X40X103K		Cabinet top cover	66D616
R-9	470 ohms 1/2 watt, carbon	23X20X471K		Cabinet front panel	68D157
R-10	12,000 ohms 4 watts, carbon	23X65CE123K		Dial cord, 40 inch	38A001
R-11,18,65	1000 ohms 1/2 watt, carbon	23X20X102K		Dial, band spread	83B372
R-12,59	2.2 megohms 1/2 watt, carbon	23X20X225M		Dial, main tuning	83C240
R-14	47,000 ohms 1/2 watt, carbon	23X20X473M		Foot, mounting; rubber	16A007
R-15,29,58	100,000 ohms 1/2 watt, carbon	23X20X104M		Glass, band spread dial	22A307
R-20	500,000 ohms, VOLUME control	25A534		Glass, main tuning dial	22B199
R-21	150 ohms 1/2 watt, carbon	23X20X151M		Iron core, RF	77A068
R-22	270,000 ohms 1/2 watt, carbon	23X20X274K		Knob, BAND SELECTOR	15A266
R-23,61	470,000 ohms 1/2 watt, carbon	23X20X474M		Knob, PITCH CONTROL	15A058
R-24	680 ohms 1 watt, carbon	23X20X681K		Knob, SENSITIVITY, VOLUME and TONE	15A049
R-25	15,000 ohms 1 watt, carbon	23X30X153M		Knob, TUNING and BAND SPREAD	15AU48
R-27,66	47,000 ohms 1 watt, carbon	23X30X473K		Lock, line cord	76A397
R-28	22,000 ohms 1/2 watt, carbon	23X20X223M		Speaker, 5" PM	85B050
R-30,68	10 ohms 1/4 watt, carbon	23X10X100M		Spring, diaj cord	75A012
R-32	1500 ohms 10 watts, WW	24BG152E		Spring, retainer; band spread and main tuning drive shafts	75A062
R-33	15 megohms 1/4 watt, carbon	23X10X156M		Terminal strip, antenna	88A032
R-34	10,000 ohms 1/2 watt, carbon	23X20X103M			
R-35	27 ohms 1/4 watt, carbon	23X10X270K			
R-60,67	330,000 ohms 1/2 watt, carbon	23X20X334K			
R-63	6.8 ohms 1 watt, carbon	23X30X068K			
R-64	330 ohms 1/2 watt, carbon	23X20X331K			
<b>COILS AND TRANSFORMERS</b>					
L-1	Coil, antenna; band 4	51B783	LS-1		
L-2	Coil, antenna; band 3	51B782			
L-3	Coil, antenna; bands 1 and 2	51B1241			
L-4	Coil, RF; band 4	51B787			
L-5	Coil, RF; band 3	51B786	TS-1		



1. RESISTOR VALUES ARE IN OHMS UNLESS OTHERWISE SPECIFIED.
2. CAPACITOR VALUES ARE IN MMF UNLESS OTHERWISE SPECIFIED.
3. RESISTORS RATINGS ARE 1/2 WATT UNLESS OTHERWISE SPECIFIED.
4. BAND SELECTOR SWITCH S-1 SHOWN IN BAND 4 POSITION. FOR LOCATION OF SWITCH SECTIONS, SEE FIG. 9.

VALUES AND TOLERANCES SHOWN ARE NOMINAL AND VARIATIONS MAY BE FOUND.  
IT IS RECOMMENDED THAT THE VALUE OF ANY REPLACEMENT CORRESPOND  
TO THE NOMINAL VALUE OF THE PART BEING REPLACED.

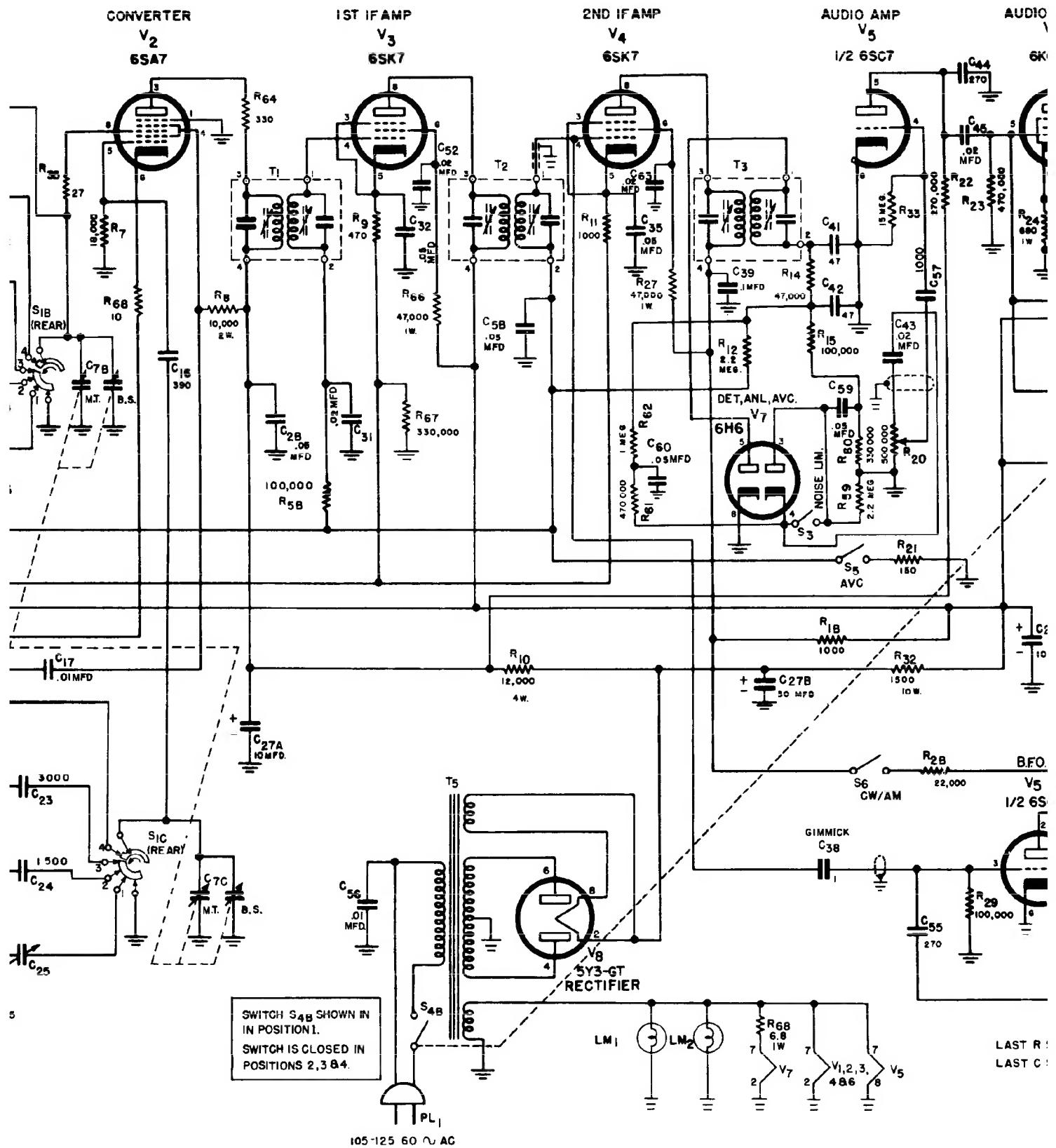
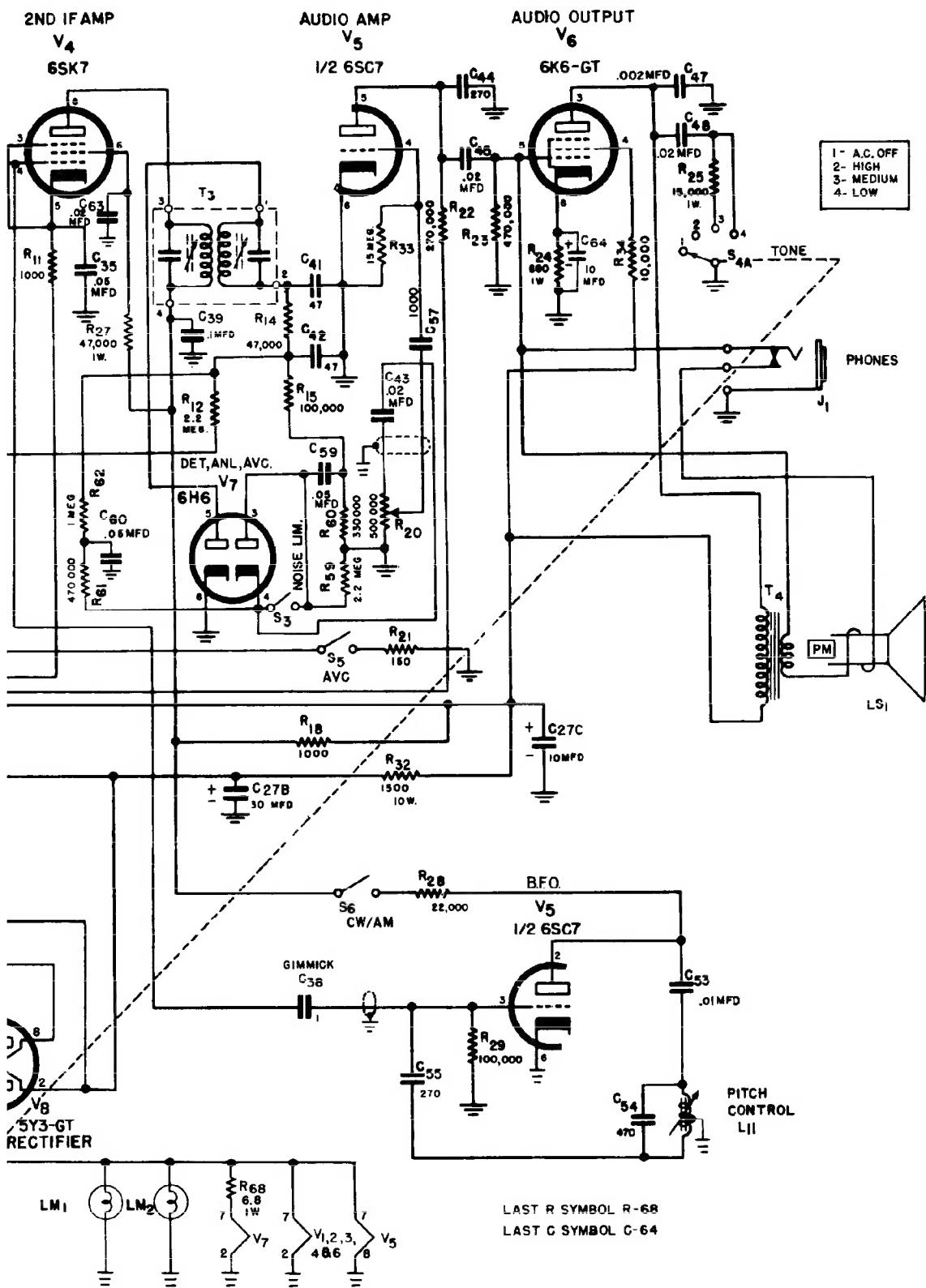


FIG. 11 SCHE

# MODELS S-40B S-40BU

RUN 3



890349-C

FIG. II SCHEMATIC DIAGRAM